

CLAIM AMENDMENTS

1 1. (Currently amended) A substantially two-phase hard
2 metal substrate body comprised consisting essentially of a WC hard
3 material phase consisting of WC and a binder phase of 3 to 25 mass
4 % which apart from at least one of the binder metals Fe, Co and/or
5 Ni contains up to 15 mass % of ~~the binder phase~~ a dissolved dopant
6 selected from the group comprised consisting of Al, Cr, V, Nb, Ta,
7 Ti, Zr, and Hf, ~~characterized in that wherein~~ the percentage
8 proportion of all ~~doping agents~~ dopants as a whole in the two-phase
9 hard metal substrate body is limited to a maximum of 4 mass % in
10 that ; wherein the proportion of a cubic phase consisting of said
11 dopant in undissolved form in the two-phase hard metal substrate is
12 less than 4 volume % and ~~in that ; wherein~~ the binder metal content
13 in a ~~hard metal-substrate body boundary zone falls from up to 1 μ m,~~
14 ~~preferably up to 0.5 μ m to less than 0.5 times an edge zone of the~~
15 two-phase hard metal substrate drops to less than half the binder
16 metal content in the substrate body interior.

1 2. (Currently amended) The substantially two-phase hard
2 metal substrate body according to claim 1 ~~characterized in that~~
3 wherein the concentration of the binder metal in the binder phase
4 falls gradually toward the substrate body surface and the
5 concentration of the dopant in the binder phase gradually increases
6 in a corresponding manner.

1 3. (currently amended) The substantially two-phase hard
2 metal substrate body according to claim 1 ~~characterized in that~~
3 wherein the grain size of the WC is $\leq 1.5 \mu\text{m}$ whereby the WC fine
4 hard metal material phase (grain size $\leq 0.8 \mu\text{m}$) and/or with WC
5 ultrafine grain hard metal material phase (grain size $\leq 0.5 \mu\text{m}$),
6 preferably contain Cr, V and/or Ta as dopant.

1 4. (Currently amended) The substantially two-phase hard
2 metal substrate body according to claim 1 ~~characterized in that~~
3 wherein at lest one layer is applied to the substrate body surface,
4 the layer being comprised of a carbide, nitride and/or carbonitride
5 of Ti, Zr and/or Hf and/or of Al_2O_3 , HfO_2 , ZrO_2 , oxides, amorphous
6 carbon, diamond, cubic boron nitride, carbon nitride (CN_x) or
7 another compound of at least one of the elements B, C, N and/or O.

1 5. (currently amended) The substantially two-phase hard
2 metal substrate body according to claim 1 ~~characterized in that~~
3 wherein in the boundary zone close to the surface there is an
4 enrichment with nitride or carbonitride of the metal dopant.

1 6. (Withdrawn) A method of producing a two-phase hard
2 metal substrate body according to claim 1 in which the starting
3 mixture is preheated powder metallurgically is prepressed to a
4 green body and then in an atmosphere of a furnace is heated and
5 sintered, characterized in that in the heating phase, after
6 reaching the eutectic, but no later than reaching the sintering

7 temperature the vacuum or inert gas atmosphere is replaced with a
8 N₂ atmosphere with a N₂ pressure of $\leq 10^5$ Pa and is maintained at
9 least until the sintering temperature is reached.

1 7. (withdrawn) The method of making a two-phase hard
2 metal substrate body according to claim 1 in which the starting
3 mixture is powder metallurgically treated and is pressed to a green
4 body and finally heated in an atmosphere of a furnace and sintered,
5 characterized in that after finish sintering or optionally in a
6 final treatment above the eutectic temperature, the sintered body
7 is maintained in a N₂ atmosphere under a pressure (p) of $10^5 \text{ Pa} < p$
8 $< 10^7 \text{ Pa}$ for at least 10 minutes.

1 8. (withdrawn) The method according to claim 6
2 characterized in that the nitrogen atmosphere is established by
3 introducing precursors that is N-containing gases whereby the
4 nitrogen is formed *in situ* in the gas atmosphere.

1 9. (withdrawn) The method according to claim 6
2 characterized in that the two-phase hard metal substrate body is
3 heated up to 1250°C during the heating phase and this temperature
4 is held for at least 20 minutes, preferably more than 1 hour,
5 before the heating up is continued to the sintering temperature.

1 10. (withdrawn) The method according to claim 6
2 characterized in that initially in the heating up phase at about
3 1200°C the previously existing vacuum is replaced by an inert gas
4 atmosphere, preferably with a pressure of 10^3 Pa to 10^4 Pa and only
5 upon reaching the sintering temperature is a nitrogen containing
6 atmosphere established with a higher pressure, preferably $\geq 10^4$ Pa.

1 11. (withdrawn) The method according to claim 6
2 characterized in that the heating up rate and the cooling down rate
3 amounts to up to 10°C/min, preferably between 2°C/min and 5°C/min.

1 12. (withdrawn) The method according to claim 6
2 characterized in that the starting mixture contains in an amount of
3 up to 15 mass % of the binder phase additional carbides, nitrides,
4 carbonitrides of the elements of Group IVA or VIA of the periodic
5 system or Al or complex carbides, complex nitrides and/or complex
6 carbonitrides of the form Ti_2AlC , Ti_2AlN , Cr_2AlN , Cr_2AlC .